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Vocabulary Knowledge and Usage among Normal and Schizophrenic Subjects[1]

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I. THE PROBLEM

THE PERFORMANCE of schizophrenics on vocabulary tests has long been a controversial subject in psychological literature. It has been contended by some that the schizophrenic's relative lack of impairment on this test provides the clinician with a long needed "stable base line" from which to judge the degree of "mental deterioration" in other areas. By others the characteristic dispersion of other test scores around the allegedly stable vocabulary score is used as a device for differential diagnosis of psychopathology. Some have theorized that this stability of vocabulary test scores is due to the fact that word meanings represent "old learning," which is last to be impaired in psychopathology. Others have contended that this alleged stability is simply an artifact of the instruments commonly used to measure word meanings.

The present study proposes an intensive comparative analysis of the understanding and use of word meanings by matched pairs of schizophrenic patients and nonpsychiatric patients. The approach used is that suggested by Cronbach, who writes:

> . . . it appears that diagnostic vocabulary testing requires more valid instruments than are now available. It appears especially important, if diagnosis is to be accurate, that the possibility of obtaining credit without knowing the word be reduced to a minimum. Probably the most successful way to attain this is to ask several questions about each word. . . . It is hoped that a recognition of the weaknesses of present tests, and of the types of information about word knowledge they do not provide, will lead to a development of superior tests, especially to study breadth and precision of meaning (5, pp. 215-216).

The present study employs a battery of seven tests of word meaning, using a common core of 25 words in each test. The battery is designed to afford measurements, *for each word*, of the subject's (*a*) ability to define; (*b*) conceptual level of definition; (*c*) "breadth" of understanding (number of other words available to express the same meaning as that of the stimulus word); (*d*) preciseness of understanding; (*e*) ability to form concepts

[1] This study is a revision of a dissertation submitted in 1952 to the University of Texas in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Dr. Robert R. Blake initiated, with the author, a series of studies which led directly to this study. Though Dr. Blake was in England when the present research was conducted, much of the impetus for the study should be credited to him.

To Dr. Wayne Holtzman, who directed the study, the writer is greatly indebted for his continuous constructive criticism. Drs. Seymour Fisher and Laurence McGaughran also made valuable suggestions on the design of the study. A special debt is owed to Drs. Ruth Hubbard and Holland C. Mitchell, at the Waco Veterans Administration Hospital, and to Drs. Isham Kimbell, Howard Schnur, George Granville, and Lewis Leavitt, at the Houston Veterans Administration Hospital, for their assistance in the collection of the sample of subjects used in the study.

with the words (similarities test); (*f*) conceptual level of concepts (similarities) formed with the words; (*g*) ability to communicate with the words; (*h*) ability to reason symbolically with the words; and (*i*) associations to the words. By means of such a test battery it is possible to map out, so to speak, an "area of meaning" for each word.

By administering this battery to matched pairs of schizophrenic and nonpsychiatric patients, the quantitative measures of the area of meaning around each word may be compared. Such a comparison should provide a rigorous test of the hypothesis that in schizophrenia significant distortions in word meanings take place which go undetected by present vocabulary tests.

Yacorzynski, Cameron, and Goldstein have observed distortions of word meanings by schizophrenics which relate to a lower conceptual level of definition, less precision in the understanding of word meanings, and impaired ability to communicate, to form concepts, or to reason symbolically with words. These assertions are presented more formally in section IV to derive eight specific hypotheses which are to be tested in the present study.

II. SUBJECTS

The total sample of subjects for this study consisted of an experimental group of 40 patients in a Veterans Administration hospital diagnosed as chronic paranoid schizophrenic, and a control group of 40 patients in another Veterans Administration hospital who were undergoing treatment for or recuperating from nonpsychiatric illnesses. Each schizophrenic subject was matched with a nonpsychiatric subject for age, sex, educational level, and Wechsler vocabulary raw score.

A. Experimental Subjects

These subjects were drawn from patients who had received the diagnosis of schizophrenic reaction in a Veterans Administration hospital. This diagnosis was arrived at by means of psychiatric interviews and a clinical psychologist's report based on a psychological test battery. The final classification was made by the psychiatrist. Each patient received physical, neurological, and laboratory examinations to determine the possibility of organic complications. All patients with such complications were excluded from the sample. The diagnosis of schizophrenia covers an extremely wide variety of behavior pathology. In order to select as homogeneous a group as possible within this broad category, the entire sample consisted of those classified as schizophrenic reaction, paranoid type.

The patients in the experimental group were obtained from the "chronic" building in the VA neuropsychiatric hospital at which the sample was gathered. This building is reserved for patients who have had repeated admissions and who have remained unresponsive to treatment. No patient in the present sample had received electroshock, insulin coma, or other "drastic" treatment within a year before testing. All patients in this building who were classified as paranoid schizophrenic and who would consent to the examination were tested.

The choice of chronic paranoid schizophrenics as the experimental group was also influenced by Kasanin's work with disturbances of conceptual thinking in schizophrenia. In his classification

Kasanin found the most marked conceptual disturbances in hebephrenic schizophrenics and in "old cases of schizophrenia showing definite ideas of reference with delusions of persecution, associated with little emotional reaction to these ideas" (8, p. 47). The latter classification is broadly descriptive of the group of chronic paranoid schizophrenics in the present sample.

In all, 64 chronic paranoid schizophrenic subjects were seen. Of this number, four were too disorganized to comprehend the nature of the task, three refused to take the examination, and three refused to continue at different points of the examination. Of the remaining 54 subjects, 40 were successfully matched with control subjects.

B. Control Subjects

These subjects were drawn from the large patient population of a Veterans Administration general-medical-surgical (GM&S) hospital. Patients whose illnesses had neuropsychiatric significance or who had degenerative diseases or diseases seriously affecting the central nervous system were not included. The patients were selected from those with ailments that would be least likely to affect performance on the test battery.

There were a number of advantages in using these particular subjects as the control group whose performance on conceptual tasks was to be compared with that of schizophrenic patients who are also veterans. They had, to some degree, passed through a preselection process which made them, as a group, more comparable to the schizophrenic sample. The subjects in each group met the same minimum physical and mental requirements for service in the armed forces. Also, they passed through somewhat the same experience of exchanging civilian status for service discipline for a period of time. Variance due to institutionalization and examiner influence was minimized, since subjects in both groups were tested in similar hospital settings by the same examiner. Other variables, such as age, sex, educational level, and Wechsler vocabulary score, were directly controlled.

C. Matching

All identifying marks were removed from the Wechsler vocabulary test forms and random numbers were assigned by an assistant. The protocols were then shuffled. Each item was scored on all tests before moving to the next item. Wechsler's criteria for scoring were followed strictly. After all the Wechsler vocabulary tests had been scored, the following information about each subject was typed on separate index cards: (*a*) experimental or control, (*b*) random number, (*c*) age, (*d*) years of formal education, and (*e*) Wechsler vocabulary raw score.

Pairs were matched in terms of the information on these cards. In the matching procedure, first priority was given to the equating of Wechsler-Bellevue vocabulary raw scores for each matched pair. Educational level and age received second and third priority, respectively.

Most pairs were matched within one raw score point on the Wechsler vocabulary test. The difference in group means is 0.1 raw score point. Educational differences between pairs average one and one-half years of formal education. The mean educational level of the experimental group is 10.4 years; the control group mean is 9.5 years. The mean age of the experimental group is 41 years; the control group mean is 40 years. All subjects are males. The goodness of the matching was tested by significance of mean differences, none of which approaches statistical significance.

D. Cooperation

The work of Shakow with schizophrenics suggests that many of the "diagnostic" differences in their test performances may be due simply to their lack of cooperation with the examiner. He notes:

In some situations, usually those of a simple type, a high level of *cooperation* is the factor which seems to be important in eliminating the differences which exist between the schizophrenic and normal levels (12, p. 387).

In order to estimate the effect of this variable, each experimental and each control subject was rated by the examiner on a six-point scale of cooperativeness. The categories of the scale are as follows:

1. Openly negative toward task. Performs very reluctantly.
2. Somewhat resistive to task. Performs with little interest.
3. Doesn't mind task. Performs with moderate interest.
4. Some enjoyment of task. Performs with more than moderate interest.
5. Task seen as a challenge. Performs with great interest.
6. Greatly motivated to make highest possible score. Very absorbed in his performance.

No attempt was made to match subjects on cooperativeness. However, little group difference in cooperativeness appears. The experimental group mean rating on cooperation is 3.6; the control group mean is 3.9. This difference of 0.3 does not approach statistical significance.

All subjects were tested and then rated for cooperativeness by the same examiner. No objective measure of the reliability of these ratings is available. Further, although the examiner made a special effort to rate the patient on attitude toward the examination rather than on the level of performance, no objective measure of the examiner's success in this effort may be provided. Another source of possible bias was the examiner's knowledge of the subject's diagnosis at the time of rating. Because of the evident subjectivity of these ratings, they are offered as only suggestive of the influence of subject cooperativeness on performance with these tasks.

III. SELECTION OF TESTS OF WORD MEANINGS

As asserted by Yacorzynski, Cronbach, and others, "knowledge of a word" implies a great deal more than the ability to define the word. The present battery follows Cronbach's suggestion that the most successful technique of measuring understanding of word meaning is to ask several questions about each word.

For the purposes of this investigation, all the test words should be familiar to all the subjects. The subjects already have been matched on their "fund of words" by means of the Wechsler vocabulary test. The specific purpose of this battery is not to tap "size" of vocabulary but to compare underlying differences in knowledge of the meanings of words that the pairs of subjects are able to define. Words with which one or both subjects [illegible] parison and would serve no purpose in the battery. The 25 words used in the present list are among the most frequently used English words.

At the same time the words should vary in complexity, for if differences between the two groups appear, one is interested in the *level* at which they appear. One way of varying complexity is to grade the words in terms of familiarity, as is done in standard vocabulary tests. As mentioned before, however, this would tend to defeat the specific purpose of this battery. A more satisfactory way of varying complexity is to vary the "level of abstraction" of the words.

A useful distinction by Ogden and Richards on types of definitions is pertinent to our effort to select words that

are very familiar but which vary in complexity. Definitions may be made either in terms of *things* or in terms of *other words* with a common referent. Thus, when

> . . . we define *words* we take another set of words which may be used with the same referent as the first, i.e., we substitute a symbol which will be better understood in a given situation. With *things*, on the other hand, no such substitution is involved. A so-called definition of a horse . . . is a statement about it enumerating properties by means of which it may be compared and distinguished from other things (10, p. 110).

Allport makes a similar distinction between types of words. He puts words into two general classes. One class

> . . . consists of words denoting objects which impinge, directly or through the surrounding media, upon our sense organs—objects which can be observed, described, manipulated, analyzed, experimented with, and generalized about (1, p. 19).

The other class of words consists of

> . . . those dealing not with objects capable of being explicitly treated, but with abstract things, such as relationships. . . . They cannot be heard, seen, handled, or pointed to with any part of our bodies (1, p. 19).

With these distinctions in mind, words may be selected which are very familiar to the subjects but which are different in "level of abstraction." The first ten words in the present list fall into Allport's first class. That is, they are words which have a "thing" referent. Each may be defined in a relatively concrete manner by a "statement about it enumerating properties. . . ." These words are, for example, *house, car, boat,* etc.

The other 15 words in the list fall into Allport's second category. They are words *without* a "thing" referent. To define these words the subject must "take another set of words which may be used with the same referent as the first, i.e., substitute a symbol which will be better understood in a given situation." These are words like *all, new, faith,* etc.

Theories concerning the "concreteness" of schizophrenic thinking suggest that the greatest difference between the schizophrenic and the control subjects might occur in the conceptual level of their use and understanding of the words in the second part of the list. White states explicitly:

> The thinking and speech of schizophrenia while of a lower order of abstraction nevertheless make use of words which we are accustomed to use to express a higher order (14, pp. 339-340).

It is entirely possible that the performance of schizophrenic subjects may not appear different from that of the control subjects on verbal tests which use simple words that are names of specific things. However, on the words that represent higher abstractions it might be that schizophrenics would continue to operate on a lower conceptual level. The words in the present list are selected so as to afford an examination of this possibility.[2]

A wide variety of techniques may be devised to test understanding of word meanings. The present selection of tests may be divided into two groups, those measuring *understanding* of the word and those measuring the word "as a symbol that can be put to some use in thinking or communication," that is, the ability to *use* the word.

The tests of understanding of word meanings are:

1. A *definition* test, which measures the ability of the subject to verbalize what he means by the word and also the conceptual level of his verbalization.
2. A *(recall) synonym* test, which measures the subject's active understanding of the breadth and preciseness of meaning of the word.
3. A *(recognition) synonym* test, which meas-

[2] The first ten words in the list are: house, clock, clothes, car, dirt, boat, door, food, street, garbage. The second fifteen words are: friend, big, faith, command, new, add, danger, all, strong, death, God, wise, hate, enemy, master.

ures the subject's passive understanding of the breadth and preciseness of meaning of the word.

The tests of ability to use the word are:

4. A *sentence construction* test, which measures the subject's ability to use the word meaningfully to communicate.

5. A *similarities* test, which measures the ability of the subject to form concepts with the words and also the conceptual level of his performance.

6. An *analogies* test, which measures the ability of the subject to use the words in symbolic reasoning.

A seventh test is provided in the battery to afford some measure of the kind of associative links the subject has formed with each word. For this purpose a *word association* test is included.

In the construction of these tests a large number of familiar words were first compiled. Of this number, about 100 were selected which had from three to as many as ten acceptable synonyms. The original battery of tests was built around 50 of these words.

This battery then passed through nine months of pretesting. During this period, the battery was administered to a small group of subjects, revised, administered to another small group, revised, etc. Subjects used in the pretesting included hospital and clinic nonprofessional personnel, psychiatric patients, and nonpsychiatric patients.

In the pretesting period, items which presented scoring problems were eliminated. Ambiguous items were revised or eliminated. Some items were made more difficult, others simpler. An attempt was made to alter each test so that it elicited a maximum range of scores, with a mean score near the middle of the range of possible scores.

Each test was considered adequate for the purpose of this study when: (*a*) the test and instructions were easily understood by the subject; (*b*) the test yielded a wide range of scores with (*c*) a mean score near the mid-point or third quartile of the range of possible scores; and (*d*) the tests could be scored with maximum reliability.

The word association test is the only timed test in the battery. In order to minimize practice effect, tests were presented in the following sequence: (*a*) word association; (*b*) Wechsler vocabulary list; (*c*) definitions; (*d*) synonym (recall); (*e*) sentence construction; (*f*) similarities; (*g*) analogies; (*h*) synonym (recognition). Total time of the examination varied from a little over one hour to three hours, depending on the subject. Average time was about two hours.

In the scoring of these tests identifying marks were first removed from all protocols and random numbers assigned by an assistant. Protocols were then shuffled. No protocol was scored prior to matching.

The analogies test and synonym (recognition) test were scored by means of a template. For other tests a "scoring manual" was devised in the following way: on each test, the protocols of the 20 subjects left over after matching were scored first. Each response was entered under a specified scoring category. Almost all arbitrary decisions about scores of "borderline" responses were made at this level. Each item on a test was scored on all protocols before the next item in line was scored. The completeness of these scoring keys made the scoring of the matched-pair protocols an almost mechanical process.

To obtain an estimate of the reliability of the scoring categories, every fifth protocol of each test was scored by an independent worker. This independent scorer was provided with the "scoring manual" for each test. The scorer was

given no instructions other than to follow the manual strictly in scoring the protocols. All identifications had previously been removed from the protocols. The scores given by the first scorer were, of course, unknown to the second.

The scores on each protocol were then compared, item for item, to determine the degree of agreement. The agreement on each test was: (*a*) sentence construction test, 92 per cent; (*b*) similarities test, 96 per cent; (*c*) associations test, 92 per cent; (*d*) definitions test, 84 per cent; (*e*) synonym (recall) test, 96 per cent. The analogies test and synonym (recognition) test were scored mechanically by means of templates. The high percentage of agreements between independent scorers indicates that the tests were scored in a reliable manner.

IV. RATIONALE AND DESCRIPTION OF TESTS, AND RESULTS

The tenability of eight specific hypotheses concerning the nature of the schizophrenic's understanding and use of word meanings is examined in this study. In the following account the rationale of each subtest and a formal statement of the specific hypothesis which the subtest is designed to evaluate are presented. Following a description of each subtest, the results obtained from its application to the present sample of subjects are outlined.

Each hypothesis is tested by a *t* test of the significance of the difference between experimental group mean and control group mean. For all such significance tests, the *t* formula for the difference between correlated means is employed. The hypothesis as stated in each instance has a directional character. In each case it is predicted not only that the experimental group mean will be different from the control group mean, but also that it will be less than the control group mean. Therefore, probability values are interpreted in the light of a one-tailed test of significance. A summary of results is provided in Table 1.

A. Definitions Test

Rationale. This test provides a measure of the subject's ability to verbalize what he means by the familiar words listed. According to Yacorzynski (15) the "concrete" thinking of schizophrenics should be reflected in definitions of a lower conceptual level than definitions given by the control subjects. Goldstein and White assert that when a schizophrenic uses an abstract word he means by it something concrete; he has lost the "abstract attitude." Definitions given by each subject were scored in terms of conceptual level, thus providing a test of the following hypothesis:

Hypothesis 1: *Definitions given by schizophrenic subjects will be of a lower conceptual level than those given by the control subjects.*

The definitions test also provides information relating to an interesting speculation. Goldstein states that normally a person

". . . combines both (the concrete and abstract) attitudes and is capable of shifting from one to the other at will according to the demands of the situation. Some tasks can be performed only by virtue of the abstract attitude; for others the concrete attitude is sufficient" (6, p. 20).

The schizophrenic, Goldstein states, is unable to make this shift to the abstract attitude. Now, as Ogden and Richards point out, definitions may be given either in descriptive terms of *things* or in terms of other abstract words with a common referent. The present list contains ten words which are names of *things* and fifteen words which have no *thing* referent. It seems reasonable to assume that the first ten words would be more conducive to descriptive, "concrete" definitions than would the last fifteen. Thus it appears logical that if the alleged "con-

TABLE 1

MEANS, STANDARD DEVIATIONS, AND SIGNIFICANCE OF MEAN DIFFERENCES BETWEEN SCHIZOPHRENIC AND CONTROL GROUPS ON TESTS OF WORD MEANINGS
(N=40 matched pairs)

Test of Word Meanings	Mean Scores				p
	Schizophrenic		Control		
	M	*SD*	M	*SD*	
Definitions					
Adequate definitions	24.3	.3	24.5	.3	—
Abstract definitions (I+II)	14.2	5.6	14.6	5.0	—
Abstract definitions (Part I)	6.2	2.9	6.2	2.5	—
Abstract definitions (Part II)	8.3	3.2	8.1	3.0	—
Synonym (Recall)					
Percentage of correct synonyms	53.3	19.2	59.4	10.4	.05
Synonym (Recognition)					
Percentage of correct synonyms	74.8	15.6	77.2	10.9	—
Percentage of neologisms	1.0	1.4	.6	.9	—
Sentence construction					
Adequate sentences	7.9	2.6	9.7	2.6	.001
Similarities					
Adequate (Part I)	5.1	1.5	6.0	1.1	.001
Abstract (Part I)	3.3	1.8	4.2	1.5	.001
Adequate (Part II)	5.2	2.7	6.0	4.1	—
Abstract (Part II)	3.9	2.5	4.6	2.5	—
Adequate (I+II)	10.3	3.8	12.0	3.2	.001
Abstract (I+II)	7.2	4.1	8.8	3.3	.001
Percentage of adequate also scored abstract	65.7	19.7	71.9	15.8	.05
Analogies					
Number correct	6.6	2.8	7.6	2.2	.05
Word association					
Relatedness score	58.9	9.0	63.5	9.5	.001

Note: When dealing with the hypothesis that the mean of the schizophrenic group is less than the control group mean, the one-tailed test of significance is used.

creteness" of schizophrenics is reflected in their definitions of words, it is most likely to appear in the definitions they give to the last fifteen words in the list.

Description. The test itself consists of the basic 25 words to be used in all tests in the battery. The test is administered verbally, with the following instructions: "I want you to tell me what these words mean. 'House.' What does the word 'house' mean?" etc.

Subjects are urged to attempt a definition despite difficulties in verbalizing what the word means to them.

Scoring. The test is scored for the total number of abstract definitions given and for the total number of adequate definitions given. Scores on the first ten and last fifteen words in the list are tabulated separately.

Definitions are scored as abstract when they consist of a synonym of the test word (e.g., *clothes,* garments; *big,* large), or in terms of a category (e.g., *car,* vehicle; *hate,* an emotion). Definitions are scored adequate when the subject indicates clearly in his verbalization that he has some accurate understanding of the meaning of the word.

Results. It may be seen from Table 1

that the schizophrenic and control groups defined the basic 25 words equally well. The mean number of adequate definitions given by the schizophrenic and control groups is 24.3 and 24.5, respectively.

The schizophrenic group gave a mean of 14.2 abstract definitions. The control group mean of abstract definitions is 14.6. This mean difference of .4 is not significant. These data, which demonstrate no significant difference in the conceptual level of definitions given by schizophrenic subjects and by the control subjects, do not support Yacorzynski's hypothesis.

Since the last 15 words have no *thing* referent, it was felt that here the alleged inability of schizophrenics to assume the "abstract attitude" would be most clearly revealed. From Table 1 it may be seen that when results of the definitions test are divided into Part I (first ten words) and Part II (last 15 words), no significant differences between the group means appear at either level. Thus, this speculation is not supported by the data. It is notable, however, that both groups gave about 62 per cent abstract definitions to the first ten words and about 55 per cent abstract definitions to the last 15 words. It would appear that for both groups the words in the second part of the test were slightly less conducive to abstract responses than words in the first part.

B. Synonym (Recall) Test

Rationale. When a subject is asked to give as many synonyms for a word as he can, he in effect is being asked to define the word many times. His "definitions" furnish an indication of the conciseness of his concept of what the word symbolizes. He must select from numerous associations only those words that symbolize an identical concept; related but nonsynonymous words must be discarded.

According to Cameron, this is precisely what the schizophrenic is unable to do. Cameron asserts that a special characteristic of "schizophrenic language" is its extremely loose organization. ". . . the substitution of an approximate but related term or phrase for the more precise definitive term" is characteristic.

From Cameron's theoretical position it should be predicted that the schizophrenic would tend to offer as synonyms many words which, though possibly related, do not qualify as synonyms. The present test provides a measure of this alleged overinclusive and "fuzzy" understanding of word meanings in schizophrenic subjects.

Hypothesis 2. *The schizophrenic's understanding of word meanings will be different from that of the control subjects in that it will be characterized to a greater extent by substitution of approximate but imprecise terms.*

Description. The test is comprised of the basic word list, in the same sequence as in the definitions test. It is administered verbally with the following instructions:

> Tell me all the words you can think of that have the same meaning as this word. For example, words having the same meaning as *little* are: small, tiny, diminutive, and so on. Now, how many words can you think of that have the same meaning as the word *house*, etc.?

Scoring.[3] The test is scored in two ways:

1. The total number of correct synonyms given.
2. The total number of words offered as synonyms that do not qualify as synonyms.

[3] The stimulus word *God* elicited a wide variety of esoteric words which evidently are considered synonyms for *God* by little-known sects. To avoid making arbitrary distinctions among these words, the stimulus word *God* is not scored in this test.

Results. A high percentage of correct synonyms indicates that the subject tends to be relatively exact and precise in his concept of the meaning of the test words. Conversely, a low percentage of correct synonyms indicates that the subject tends to include relatively more discrepant meanings in his concept of the meaning of the test word. Each group gave about the same mean number of total responses; schizophrenic group, 50.8, control group, 49.1. However, the schizophrenic group gave fewer correct synonyms and more incorrect synonyms than the control group.

The percentage of adequate synonyms given by the control group is 6.1 per cent greater than that of the schizophrenic group. This mean difference is significant at the .05 level. It is evident that the schizophrenics in this group are less precise in their understanding of the meanings of the test words than are the subjects in the control group. These results tend to support Cameron's hypothesis.

C. Synonym (Recognition) Test

Rationale. Like the recall synonym test, this test measures the breadth of word meanings in terms of the number of symbols that the subject can recognize as having a common referent. The subject must select from a given number of words only those that "belong together" and discard those that do not "fit."

According to Cameron it is just this inability to "select and eliminate" words which is found in schizophrenic language. The present test, like the recall synonym test, provides a test of Cameron's hypothesis. The two tasks differ in that the recall test requires that the patient actively select from his own associations to the word only those words with a similar referent. Full freedom of associations is permitted, and the possibility of eliciting "approximations," distorted meanings, and purely private conceptions of the word is maximized. In the recognition synonym test, the number of possibilities is limited to the number of specific alternate words given in the test, from which the subject is to select the most appropriate. The task is one of "sorting" a limited number of words, and it thus becomes a measure of the subject's ability to maintain "adequate boundaries" in his concepts under more controlled conditions. The following hypothesis is to be tested:

Hypothesis 3. *Schizophrenics will be less able than the control subjects to maintain adequate boundaries in their concepts and will tend toward "overinclusion" in their understanding of word meanings.*

Description. The test is constructed around the basic word list. After each word eight choice words are listed. The number of correct synonyms varies from two to five of the eight alternates. The incorrect alternates are associated in some way with the test word but are not synonyms for it, e.g., *house,* roof; *God,* Bible. Scattered among the alternatives are a number of neologisms. The subjects are verbally instructed:

> After each capitalized word in this list are a number of words in small print. Underline each of the words in small print that has the same meaning as the word in capital letters. Do not guess.

These instructions are also printed on the test form.

Scoring.[4] Performance is scored in three ways:

1. Total number of correct synonyms underlined.

[4] The stimulus word *God* is not scored in this test.

2. Total number of nonsynonymous words underlined.

3. Total number of neologisms underlined.

Results. The hypothesis is tested by computing for each subject the percentage of correct synonyms among the total words underscored by that subject. The mean percentage of correct synonyms given by each group is then compared. A low percentage indicates that the subject tends to overinclude related but inexact meanings in his concept of the word meaning.

It may be seen in Table 1 that of the words underscored by the schizophrenic group, 74.8 per cent are correct synonyms. Of the words underscored by the control group, 77.2 per cent are correct synonyms. Though this mean difference of 2.4 per cent is in the direction predicted, it is not statistically significant. The hypothesis, as tested by differences in the percentage of correct synonyms given by each group, is not supported by these data.

It is notable, however, that the schizophrenic group underlined more correct synonyms, more incorrect synonyms, and more neologisms than did the control group. The mean number of all words underscored by the schizophrenic group is 77.5. The control group mean of all words underscored is 69.4. The mean difference of 8.1 is significant at the .05 level. Thus, it would appear that subjects in the schizophrenic group tended to attribute more meanings to the test words than did the control subjects.

Included among the alternate words are 13 neologisms, e.g., *demonter, euvate,* etc. The mean percentage of neologisms underscored by each group is 1.04 for the schizophrenic group and .58 for the control group. This mean difference of .45 per cent is not statistically significant.

D. Sentence Construction Test

Rationale. The preceding three tests measure different aspects of the subject's *understanding* of certain word meanings. This test measures one aspect of his ability to use these same words to communicate. The subject is asked to "write a sentence, using these words." His ability to integrate from one to three words into a meaningful sentence provides one measure of his ability to communicate with these words. Such a measure may profitably be compared with the measures of the subject's understanding of the individual word meanings.

Current hypotheses concerning the schizophrenic's distorted understanding of word meanings have been drawn almost entirely from the schizophrenic's *use* of words in concept formation tasks, sentence completions, interpretation of proverbs, clinical situations, etc. It is interesting to speculate that the primary language disturbance in schizophrenia may be not so much in his understanding of individual word meanings as in his inability to organize individual words into a meaningful communication. A comparison of performance on the three tests of word understanding with performance on tests of ability to use the same words constitutes an examination of this possibility. Concerning the schizophrenic's ability to communicate, Cameron writes:

> The continual interchange between a given person and those around him not only develops the social character of his language and thought, but also maintains it afterward at an adequate social level. For if this organization falls below the point of intelligibility where others cannot share it, and if it cannot then be amplified by other words, gestures, signs, or demonstrations, it can no longer function in communication. As we shall see, that is just what happens in schizophrenic disorganization (4, p. 52).

The present test affords a test of the following hypothesis:

HYPOTHESIS 4. *The schizophrenic's ability to integrate words into meaningful sentences will be impaired, relative to the performance of the control subjects.*

Description. The test consists of the basic 25 words. The subject is asked to construct a sentence, using these words. Difficulty of the task is varied by increasing the number of words which the subject must integrate into a sentence, beginning with one word and building up to three words.

The words are printed on individual cards. The cards are presented to the subject, and he is asked to "write a sentence, using these words."

Scoring. Sentences are scored on a pass-or-fail basis, mainly on the criteria furnished by Wells and Ruesch (13). In order to receive credit the sentence must: (*a*) state something in accord with fact and in general "make sense," (*b*) be grammatically correct, though there may be an occasional waiver on syntax (such as singular verb and plural subject), and (*c*) contain not more than two coordinate clauses. A sentence may be declarative, interrogatory, or imperative, and the critical words may be compounded. A critical word may be changed as to number, tense, or case, but not as to part of speech, e.g., loud for loudly or loudness.

In setting up a scoring key, based on 20 subjects not included in the sample, certain additional scoring principles were made more explicit. A sentence is scored as incorrect if it (*a*) makes two statements not logically related; (*b*) fails to express a complete thought; (*c*) is so ambiguous that it defies interpretation; or (*d*) uses a stimulus word as a proper name.

Inappropriate punctuation is not scored. Certain implicit words, as *I, the,* etc., may be omitted if the meaning of the sentence is otherwise clear. Somewhat inappropriate use of nonstimulus words is permitted. A sentence which contains two statements that appear logically related is scored correct, e.g., "the door was open and the food spoiled."

Results. The schizophrenic group constructed a mean of 7.9 adequate sentences, as opposed to a control group mean of 9.7 adequate sentences. As indicated in Table 1, this mean difference of 1.8 is significant at the .001 level. The hypothesis is supported by these data.

The possibility was raised earlier that the primary language disturbance in schizophrenia might lie not so much in the schizophrenic's understanding of individual word meanings as in his ability to organize individual words into a meaningful communication. It is evident from the results of this study that the schizophrenic's language disturbance is manifested both in his understanding of individual word meanings and in his ability to communicate with these words.

E. SIMILARITIES TEST

Rationale. This is essentially a task in verbal concept formation. The subject is required to verbalize a conceptual relationship among a group of words. When the subject is asked, "In what way are these words alike?" he is asked to place them in a single category, to make a broad generalization about the words. According to Goldstein, schizophrenics have lost this "categorical attitude."

> . . . in their language there is an absence of generic words which signify categories or classes. Or, when they do use such words, analysis shows that for the patient they do not correspond to generalizations (6, p. 24).

According to Goldstein, then, the schizophrenic in the present sample should be less adequate than normal subjects in the ability to extract a gen-

eral similarity from among a number of different words. This alleged inadequacy also should be reflected in a relative inability to derive a basic similarity by means of placing all words into a single, generic category. Performance on the similarities task makes possible a test of the following hypotheses:

HYPOTHESIS 5. *Schizophrenics will be less able than the control subjects to form verbal concepts with words they can define equally well.*

HYPOTHESIS 6. *The conceptual level of verbal concepts formed by schizophrenic subjects will be less "abstract" than that of the control subjects.*

Description. The test is composed of groups of two to four words which may be "categorized" under a single concept. Words in the first seven items refer to *things*. These words may be "categorized" or they may be related to each other in descriptive terms. Thus, *clock* and *ruler* may "belong together" under the generic term "measurement," or because they "both have numbers on them." Words in the second ten items have no *thing* referent and most must be categorized in abstract terms to be adequate.

Administration is verbal, with the following directions:

> Now I am going to read you some groups of words. I would like you to tell me what the words in the group have in common; that is, in what way they are alike.

Scoring. Responses in which the cluster of words is grouped into an appropriate category are scored "abstract." Responses which do not place the words in a category but describe a meaningful similarity among the words are scored "adequate." Scores on the first and second parts of the test are tabulated separately.

Results. The schizophrenic group gives a mean of 10.3 adequate similarities. The control group mean is 12.0. From Table 1 it may be seen that this mean difference of 1.7 is significant at the .001 level. It is evident that the schizophrenics, as a group, are less able than the control subjects to form verbal concepts with words that the subjects in each group define equally well. These data support Hypothesis 5.

To test Hypothesis 6, responses to the similarities test are dichotomized into abstract and not-abstract instead of in terms of adequacy. It may be seen in Table 1 that the schizophrenic group mean of abstract responses is 7.2. The control group mean is 8.8. The difference of 1.6 in group means is significant at the .001 level.

Another method of testing this hypothesis is by comparing the percentage of abstract responses to total adequate responses given. These mean percentages are 65.7 for the schizophrenic group and 71.9 for the control group. Table 1 indicates the mean difference of 6.2 per cent to be significant at the .05 level. Thus, it is evident not only that the schizophrenic group is less able than the control group to form adequate verbal concepts with these words, but also that the conceptual level of their adequate responses is lower than that of the control group. It was also speculated that the schizophrenic subjects would experience the greatest difficulty on the last ten items, which make a greater demand on the subject to assume the "categorical attitude" than do the first seven items. Actually, both groups appear to have found the last ten items more difficult than the first seven. Each group gave about 18 per cent fewer adequate responses and about 9 per cent fewer abstract responses to the last ten items. As

on the definitions test, both groups evidently find words which have a *thing* referent easier to deal with than words which have no *thing* referent. However, no significant difference appears between groups in this respect.

F. Analogies Test

Rationale. This is one measure of how well the subject is able to reason with the words he has defined. The subject is asked to abstract a general principle from the relationship of two words and to find among another group of words two that have an identical relationship to each other. To perform successfully the subject must be able to generate hypotheses concerning the kinds of relationships that might obtain between the first two words and to discard all but the one relationship that "fits" among the possibilities afforded by the third word and one of the four alternate words.

Goldstein asserts that the abstract attitude is basic to this ability "to generalize, to abstract common properties, to plan ahead ideationally, to assume an attitude toward the 'merely possible' and to think or perform symbolically" (7, p. 19). Goldstein goes on to caution that analogies may sometimes be solved by roundabout "concrete" ways. However, if an impairment of abstract attitude is characteristic of schizophrenia, it seems reasonable to assume that it would appear in a comparison of the performance of 40 matched pairs of schizophrenic and control subjects on an eleven-item analogies test. The present task is considered a fair test of the following hypothesis:

Hypothesis 7. *Schizophrenic subjects will be less adequate than the control subjects in the ability to reason symbolically with words they can define.*

Description. The test consists of 11 analogies which incorporate words in the basic word list. Each analogy follows this pattern: *boat* is to *water* as *car* is to —— float, land, wheels, ride. The subject is to underline the one appropriate word among the four alternatives.

The following instructions are given on the test form and are first read to the subject:

> In each of the lines in this test, the first two words fit each other in a definite way. You are to draw a line under the one word in capital letters that fits the third word in just the same way that the second word fits the first.

On the test form, two examples are given with the correct answer already underlined. The subject is asked to explain these two analogies. If the subject fails, the examiner explains the relationship. A third example analogy is given for the subject to solve himself. This is also explained by the subject before he begins the test proper.

Scoring. Total score is the number of correct answers.

Results. The mean score of the schizophrenic group is 6.6 as opposed to a control group mean of 7.6. This mean difference of one score point is significant at the .05 level. This difference tends to support the hypothesis that schizophrenics are less able than normal subjects to reason symbolically with words which each can define equally well.

G. Word Association Test

Rationale. This test is included in the battery to furnish evidence on the character of the schizophrenic's "associative links" to his words. The subject's understanding of the meaning of a word should be closely related to his associations to that word. Pillsbury and Meader describe this relationship in the following way:

The study of the development of words is a study of the associates a word has. Take the word *puss*. *Puss* is made to cover all small animals, but the meaning is dependent upon the associates and the associates determine the character and extent of the meaning. As the vocabulary grows and experiences accumulate, the meanings of the words change with them (11, p. 175). The meaning of a word is primarily the associates that it partially arouses and which give it color. When the associates that are excited change, the meaning of the word changes (11, p. 185).

Now, according to Cameron, the schizophrenic's understanding of word meanings is imprecise, overinclusive, and approximate. It seems reasonable to assume, then, that this "looseness" of understanding will be reflected in associations which are less closely related to the stimulus word than are the associations of the control subject. The associations test provides a test of the following hypothesis:

HYPOTHESIS 8. *The schizophrenic's associations to words that he can define will show less meaningful relationship to the stimulus word than will the control subject's associations.*

Description. The 25 words in the basic list are presented in the same order as in the definitions test. The subject is instructed as follows: "I am going to read you a list of ordinary words, one by one. When I say the word, answer with the first word that comes into your mind."

Scoring. Each response is given a score from 0 to 3 on the following basis:

0—subject does not produce an association, or subject produces a multi-word response.

1—subject produces a single word response which bears no meaningful relationship to the stimulus word, e.g., *faith*, "box."

2—subject produces a single word response which is very indirectly or "loosely" related to the stimulus word, e.g., *strong*, "physical."

3—subject produces a single word response which is closely related to the stimulus word. Some typical relations between stimulus and response words are:

a. use, e.g., *car*, "ride."
b. attribute, e.g., *car*, "wheels."
c. category (superordination), e.g., *car*, "vehicle."
d. synonym (coordination), e.g., *car*, "automobile."
e. example (subordination), e.g., *car*, "Ford."
f. opposite (contrast), e.g., *danger*, "safety."

Results. The responses of each subject were scored on a four-point scale of relatedness. The group mean scores were then compared as a test of the hypothesis. Table 1 indicates a mean score of 58.9 for the schizophrenic group and 63.5 for the control group. The mean difference of 4.6 is significant at the .001 level. Therefore, the hypothesis is supported by these data.

H. COOPERATION

It has been stated by Shakow that much of the schizophrenic's failure to perform well on vocabulary tests may be attributed to lack of cooperation. In the present study, the mean cooperation rating of the schizophrenic group, on a six-point scale, is 3.6. That of the control group is 3.9. The mean difference of 0.3 does not approach statistical significance. On the basis of these results, it would not appear that the significant differences between the performance of the schizophrenic group and the control group are due to differences in level of cooperation.

Significant positive correlations between cooperation rating and test performance are evident for both groups. These correlations range from .30 to .47 in the schizophrenic group and from .31 to .49 in the control group. Slight differences between groups in the degree to which cooperativeness is related to scores on specific tests are noted. However, these differences go in one direction as often as in the other direction.

It should be noted that these ratings

represent the subjective judgments of one examiner and should be interpreted with this reservation in mind. The writer, however, is aware of no other study in which schizophrenic subjects are rated on cooperativeness *in relation to* control subjects who are paired with the schizophrenics for age, sex, educational level, and vocabulary score, and who are examined under grossly comparable hospital conditions. The present results, though tentative, suggest the hypothesis that schizophrenic subjects are no less cooperative than other subjects *when tested under comparable conditions.*

V. DISCUSSION AND CONCLUSIONS

It is evident from the results of this study that the schizophrenic's understanding and use of word meanings differs in several important respects from that of the control subject.

Application of the scoring criteria employed by ordinary vocabulary tests does not reveal these differences. Nor do differences appear between matched pairs of schizophrenic and control subjects when the usual scoring criteria are made more elaborate. This is demonstrated by an earlier study (9), in which each definition is placed into one of five categories of conceptual level, and also by the present study.

However, when more than one response to each word is elicited, significant distortions in the schizophrenic's understanding and use of words begin to appear. It is found that the schizophrenic is significantly less precise in his understanding of word meanings. Though he may seem to define words as well as other people, he is less able to utilize these words as conceptual instruments. Further, the schizophrenic's ability to integrate words into meaningful sentences appears impaired.

Yacorzynski has offered the hypothesis that "the reason why the vocabulary of the deteriorated individuals remains relatively unchanged is because easier methods of reaching the same end results are left to the organism even if the more difficult solutions are no longer available" (15, p. 265).

An attempt to test this hypothesis by searching for differences in conceptual level of definitions given by normal and by schizophrenic subjects yielded negative results (9). It now becomes apparent that these negative findings are due more to inadequate methodology than to lack of validity of the hypothesis. The overall results of the present study clearly demonstrate that although the schizophrenic may appear to "define" words as adequately as the control subject, he is less able than the control subject to attain the "more difficult solutions" of further differentiating the word meanings, or to use the same words in reasoning or in communicating.

The fact remains that the schizophrenic's score on a standard vocabulary test does not appear to drop significantly. Nor does the conceptual level of his definitions appear different from that of the control subject. Yacorzynski's objection that this should not be taken to mean that the subject's understanding of word meanings is unimpaired seems valid. However, the reason why this response shows no apparent impairment while other kinds of responses to the same words do show impairment, remains to be explained.

It does not appear necessary to evoke a concept of differences in "age" of each

learned response to account for this phenomenon. Such a concept would be difficult to defend. Why, for example, does the schizophrenic show impairment in ability to communicate with words that he can define? It does not seem a reasonable assumption that the schizophrenic has had more practice over a longer period in defining words than he has had in communicating with these words.

A more parsimonious rationale may be offered to account for the findings of the present study. Most definitions tests require simply that the subject indicate that he knows something of the meaning of the test words. In the synonym tests, similarities, analogies, and sentence construction tests, the subject is required to relate one word with other words in combinations of varying complexity. These tests, then, make a greater demand on differentiation *between* words than does the definitions test. Thus, in his understanding of word meanings the schizophrenic may be said to fail in finer differentiations of word meanings, although he may still be able to identify individual words.

This rationale is in close agreement with Goldstein's (7) concept of "dedifferentiation of function." Goldstein asserts that in behavioral pathology those performances which are most differentiated are lost first, while the less differentiated ones are preserved longer. Further, "dedifferentiation of language will follow the same rules which determine dedifferentiation of performance in general" (7, p. 29). Such subjects, according to Goldstein, will fail equally in familiar situations and in new ones. It is not the varying familiarity with tasks which accounts for differences in performance levels, but the varying demands of each task in terms of the differentiations required.

The discussion has stressed primarily the differences between the schizophrenic and the control subjects. Something should be said of the similarities. The group differences, though statistically significant, do not serve to separate cleanly all members of each group.

The degree of "overlap" in the performance of subjects in these two groups may be illustrated in the following way. The analogies test mean score of the schizophrenic group is 6.6. This figure corresponds to a z (or sigma) score of .36 in the control group distribution. In terms of the normal curve, then, 36 per cent of the scores of the control subjects fall *below* the mean of the schizophrenic group. In a similar calculation it may be found that 33 per cent of the schizophrenics' scores on this test fall *above* the mean of the control group. On all tests, from 25 to 38 per cent of the schizophrenics have scores higher than the control group mean. And from 25 to 36 per cent of the control group subjects scored below the schizophrenic group mean on these tests.

It is obvious, then, that the group differences reported cannot be taken as uniquely characteristic of schizophrenic individuals. These behaviors are found in all subjects. The differences are a matter of degree.

It does seem reasonable to assume, however, in the light of the group differences found, that the impact of schizophrenia results in an impairment of the individual's understanding of word meanings. This impairment, however, is so subtle and apparently so relative to the subject's premorbid ability, that a test battery such as the one used in this study certainly does not suffice to "diagnose" schizophrenia.

VI. SUMMARY

This study provides an intensive comparative analysis of the understanding and use of word meanings by schizophrenic patients and by nonpsychiatric patients. Eight hypotheses concerning alleged specific distortions in the schizophrenic's understanding of word meanings are tested. These hypotheses are derived primarily from the theorizing of Yacorzynski, Cameron, and Goldstein.

The performance of 40 matched pairs of schizophrenic and control subjects on a special battery of verbal tests is compared. Each pair is matched for Wechsler-Bellevue vocabulary raw score, age, sex, and educational level. Subjects in both groups are rated on cooperation.

All tests in the special battery are built around a common core of 25 familiar words. The battery includes tests of definitions, synonyms, sentence construction, similarities, analogies, and word association.

When the schizophrenic group's performances on this battery are compared with the control group's, the following differences become evident: (*a*) The schizophrenic is significantly less precise in his understanding of word meanings. This is most evident in his relative failure to differentiate between word meanings. (*b*) The schizophrenic is less able to use his words as conceptual instruments, e.g., his ability to form verbal concepts and to reason in analogies tests appears impaired. (*c*) The schizophrenic's ability to integrate words into meaningful communications appears impaired, though he may "define" the same words in the same way that the control subject does.

These results support the theories of Yacorzynski, Cameron, and Goldstein concerning the nature of the schizophrenic's understanding and use of word meanings. It is noted, however, that the differences in the schizophrenic's understanding of word meanings are not large enough to be diagnostic. Despite group differences, there remains an extensive "overlap" in group performances of the schizophrenic and the nonpsychiatric patients.

Cooperation ratings correlate about .40 with performance level. No significant differences between the groups in level of cooperation are evident.

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